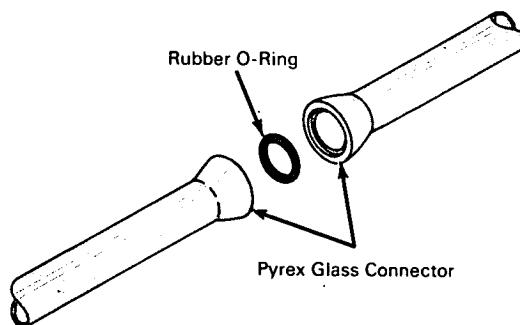
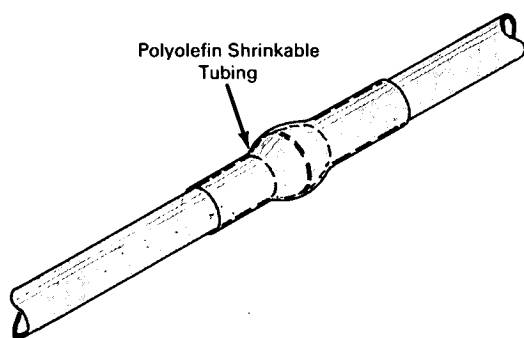


# NASA TECH BRIEF



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## Heat-Shrink Plastic Tubing Seals Joints in Glass Tubing



### The problem:

To develop a lubricant-free seal for joints of glass vacuum (or pressure) systems. The systems must contain no metal parts, no grease, and be capable of disassembly into small parts for repeated cleanings.

### The solution:

Small units of standard glass apparatus held together by short lengths of transparent heat-shrinkable polyolefin tubing. The tubing is shrunk over glass O-ring type connectors having O-rings but no lubricant.

### How it's done:

Short lengths of transparent polyolefin tubing are placed over the O-ring connections containing the O-ring. Hot air from a standard 750-degree heat gun is directed at the joint from all directions until the tubing shrinks about the joint. The tubing is then permitted to cool. This operation can be performed in

a short period of time and the polyolefin tubing can be easily removed for disassembly of the system by heating it again to a higher temperature.

### Notes:

1. These sealed joint connections were vacuumtight to a vacuum of  $10^{-5}$  mm of mercury for the length of time the system was in service (about two months) and worked well at a positive pressure of half an atmosphere. Attempts to pull the joint apart resulted in glass breakage before the tubing split. This connector was also used to connect a water distillation flask to a condensor without softening under the heat load, and proved serviceable at even higher temperatures by directing a jet of cooling air at the plastic tubing.
2. No other clamp or connector was used in conjunction with the shrinkable tubing, resulting in a lighter and more flexible glass system. No part of the polyolefin tubing contacts the contents of the system as the tubing compresses the glass end connections about the O-ring.

(continued overleaf)

3. Care must be taken to choose a brand of polyolefin tubing with a shrink ratio of at least two to one. This is necessitated by the geometry of O-ring connectors, since the tubing must be large enough to enclose the large center diameter of the glass connector and still shrink tightly around the glass tubing of the connector. Tubing heated to too high a temperature during shrinkage tends to split but this is easily prevented by proper choice of the distance between heat gun and connector.

4. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Lewis Research Center  
21000 Brookpark Road  
Cleveland, Ohio 44135  
Reference: B68-10040

**Patent status:**

No patent action is contemplated by NASA.

Source: Betty Del Duca and Arthur Downey  
(LEW-10329)